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## Observations on the Courtship of Turtles

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ON October 2, 1932, about 150 turtles were received by the Department of Zoölogy, University of Kansas, from the ponds of the State Fish Hatchery at Pratt, Kansas. On receipt they were placed in a water tank, 4 feet by 18 feet, in a room in the basement of the biology building. This room had no outside source of light, and was kept at ordinary room temperature.

A few days after they arrived they were given a large feed of cooked table refuse consisting of fruits, meats, and vegetables, which they ate with great greediness. A census was taken on October 15, and the following specimens were present: 3 *Amyda mutica*; 14 *Chelydra serpentina*; 12 *Pseudemys elegans*; 35 *Kinosternon flavescens*; 80 *Chrysemys marginata belli*. Several small *Chrysemys* had died, or had been killed; and several had been partially eaten by the larger turtles. At this time a second large feed of cooked meat and vegetables, and raw lettuce was given them. All seemed to eat to the point of satiation.

On October 16 I observed a male of *Chrysemys* behaving in an unusual manner. He would start following a female of the same species, and by swimming faster would quickly overtake her; then, by whirling himself about in the water, he would start swimming backwards just in front of the female, who continued swimming straight ahead. Then the male would slow down, and as the female approached, he would push himself forward toward her, stretch out his arms full length forward, with the palms turned outward, the claws and fingers straightened, and vibrate them rapidly against the chin and lores of the swimming female. The fingers would touch the female from five to seven times during the continued vibration, which lasted perhaps less than one and a half seconds.

He would then withdraw his arms, and continue swimming backward ahead of the female. After an interim of from four to five seconds, this same action would be repeated in practically the same way. In this particular manner the act was repeated twelve times before they were interrupted by another turtle separating them by chance. Then the male turned, sought out another mate, and began the same type of courtship with her.

The turtles were watched at this time for nearly an hour, and eight courtships of this type were observed, although it was not impossible that the same individuals had taken part in more than one. The activity took place usually, but not invariably, at the surface of the water.

On October 17 the tanks were drained and cleaned and filled with fresh tap water, after which courtship began again, and as many as eight pairs were seen performing this strange series of maneuvers at the same time. It is probable that all the adult specimens were active by this time. The females seemed, throughout my observations, to be quite indifferent to the males, paying no more attention to one than to another of the males that approached them. When the lights were turned out the turtles all seemed to become quiescent; but shortly after turning on the lights, the whole tank would begin movement, and the courtships would be continued by the *Chrysemys*. The other species, however, remained quiet at the bottom of the tank. On the succeeding days occasional observations showed that the activity was continuing unabated.

On October 26 courtship was first noticed between members of the *Pseudemys elegans* group; and the procedure was almost identical with that of the *Chrysemys*, at least the differences are not easily described, save that the act was usually not repeated more than four or five times without a temporary cessation of activity. Up to this date no turtles were seen in copulation.

On October 27 a group of *Chrysemys* males that were actively carrying on a courtship were placed in a separate tank. At first they kept swimming about very rapidly as if seeking females. Their mode of sex recognition could not be determined, save that when a male was approached, and the arms were extended, the second male would thrust his arms forward, and the two would abandon each other. My observations were interrupted, and I left, leaving the room lighted; on my return three pairs of males were keeping up the play with each other. Each kept the same approximate position, moving back a few inches; then each advancing, vibrated the

fingers against the fingers of the other. On occasion this would be kept up for two or three minutes.

On October 28, shortly after the room was lighted, the males again became active; and after a considerable amount of swimming about, three pairs of males were again observed continuing the courtship. When three females were placed in the tank, two and even more males might attempt to engage her attention. On this date a male *Kinosternon flavescens* was observed attempting copulation with a small female *Chrysemys*. The shell of the female was held by all four feet of the *Kinosternon* from a dorsal position. The latter would lift his body and strike the shells together.

On October 29 a pair of *Kinosternon* were observed in copulation, and two other pairs were observed clasping and apparently tapping their bodies together. Here the semiprehensile tail with its spine-like tip serves as a very efficient grasping organ. When clasping, the male holds the female's shell by all four of his feet and his tail. In copulation the hold of the front feet is loosened, and the male stands erect.

Two *Chelydra serpentina* were seen on November 11, their heads close together in shallow water; they appeared to be gulping in water and then forcing it through their nostrils, causing a "boiling" of the water in two areas above their heads at the surface. This was continued for about ten minutes, their heads close together, sometimes touching. After cessation of this behavior, I determined that a male and a female were involved. By this date the activity of the other forms had practically ceased, and no others were observed in copulation, except for a single pair of *Chelydra*, which were found in copulation November 4; but these became disengaged almost as soon as they were discovered, and before accurate observations could be made. A week later all the specimens were preserved. The *Amyda mutica* were all females; no sexual activity was observed in this species.

That the observed behavior of these forms constitutes the typical courtship behavior can scarcely be questioned, even though it may have been induced by high temperature and heavy feeding at a season of the year when it does not normally occur. The peculiar courtship pattern is essentially identical in *Chrysemys marginata belli* and *Pseudemys elegans*, and may likewise be the same in other aquatic genera of the family Testudinidæ.

I am uncertain whether the curious behavior of *Chelydra serpentina* is to be considered as a courtship activity or not. It was observed only on a single occasion.